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JACK JETTY

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ABSTRACT

Rivers are generally meandering. A smoothly flowing stream during low flows may attain a tremendous fury during high stages. Usually the flow of river at bends is found to erode the outer bank and aggradation on inner bank. In general such river behavior perpetrates chaos. Protection to the river banks is normally given by a variety of river training which are very costly. Therefore, generally bank protection is restricted only to the important reaches. In simple economic terms, the above situation has made the conventional river training techniques practically unaffordable for Indian states where thousands of kilometers of erosion-affected stream bank-line await remedial action. The increasing demand of bank protection work have focused attention on an imperative need to develop cost effective river training measures like Jack Jetty on sound scientific basis to tackle the twin burning problems of flood and erosion along with facilitate channelization in Indian rivers.

Keywords: Channelization, Flood Control, Jack Jetty, River Training Structure.

I. INTRODUCTION

The Rivers in alluvial plains are highly variable in their behavior and to an average man are often unpredictable. Usually a river is found to erode the outer bank and sediments get deposited on inner bank. In braided channel, however rivers erode both bed and banks at high stage and the eroded materials are deposited on the bed or banks during low stage producing a number of channels within the flood plain with bed bars, dunes, antidunes etc. It may develop unforeseen meanders, break through embankments, may attack towns and import structures by pass bridges. In general such river behaviour perpetrates havoc. Alluvial rivers are well known for their sediment load and frequently changing course. Most of the rivers in this class are notorious for overflows and breaching their banks, resulting in the floods. To avoid such damages engineers have successfully used river training works. River training works are required to stabilize the river channel along a certain alignment and with a certain cross section so that the river does not cause the damage to the land and property adjacent to its bank. It is essential to train a river for protecting its banks to avoid excessive meandering, to prevent shifting its course, maintain navigability etc. River training structure guides and forces a stream into achieving some definite objectives and protecting some defined area. River training works are becoming increasingly expensive leading to high labour cost and cost of material. So there is dire need to develop some cost effective measure for protection of rivers.

II. METHODOLOGY

If correctly installed, a jetty jack field will trap sediment and debris during flood events and essentially build up its own levee to confine the river channel. A jetty system is designed to conform to the existing regime of the river. The system prefers a concave bank of a meandering channel. The usual design employs variations on a theme of diversion lines paralleling the bank and backup retard lines,alternatively called tieback lines. They are called diversion lines because they provide diversion of the river current. The number of front lines varies from one to three (or more) depending on the angle of attack by the current. If the angle of the current is greater than 45 degrees, there is potential for damage of individual jacks in the line. At 20 degrees, the current can be trained around the curve. The sharper the angle, the more diversion lines are needed. Effective silt deposition can be achieved with one line but is vulnerable to damage by floods carrying heavy debris. The backup retard lines extend from the diversion lines in the river channel to the bank and are anchored at the bank line. Their spacing varies from 75 feet to 200 feet depending on the current's angle of attack, the more severe the angle the closer the spacing. They are called retard lines because they further retard the velocity of the current passing the diversion lines, thus inducing sediment deposition. As a rule of design, if the angle of attack is 20 degrees, the current should cut at least four lines; if the attack is 45 degrees, it should cut at least six lines.

TYPES OF JACK JETTY

- **RCC JACK JETTY.**

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- **STEEL JACK JETTY.**

III. RESULT AND DISCUSSION

Processes set in motion by Cochiti Dam in 1973 limit the effectiveness of the existing jetty fields. Less frequent inundation of floodplain area, a reduction in sediment supply from major source areas and degradation and armoring the upstream channel all dictate against the installation of new jetty fields for channel stabilization. The current debate, then, centers around what should be the fate of the current jetty systems, some of which are functioning marginally, others not at all, others having once functioned to armor riverbanks now viewed as protectors of levees. Because a degradation environment and reduced sediment supply has induced scour across some jetty lines, undercutting and burying them, the time is ripe to remove non-functioning jacks to enhance the success of river and riparian restoration projects. Resource managers, having to grapple with the necessity to provide greater certainty for the survival of endangered species while honoring the water needs of people and entities in accordance with many laws, has resulted in the implementation of several riverine and riparian restoration projects that include, among other things, removal of jetty jacks.

IV. CONCLUSION

Experimental data suggests significant reduction in flow velocity due to the presence of submerged jacks which depends on variety of situations such as, reduction in velocity with bigger jacks than smaller ones. Reduction in velocity is pronounced and is more enhanced in the initial stretch which then tapers off to minimize further downstream of the jack. Effect of submergence could be faintly observed. The work describes that effect is more prominent for when the arrangement is for 20 degree at angle of incidence of attack then at 30 degree. Analysis of the bed profile data has facilitated helped in summarizing, that jetty field performed better with lower Jetty Field Submergence Index and high sediment concentration in densely configured jetty fields. New suitable design indices and performance parameters have been developed with threshold values for various design objectives namely erosion control, moderate reclaim and heavy reclaim and design methodology could be developed with rational scientific basis. New design indices and performance parameters are evolved in this work which provides primary guidelines for developing design of a RCC jetty field based on desired design objective of erosion control.

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